An Investigation of Career and Technical Education Signature Pedagogies

Jonathon Walker, Charlene Atkins

About the Authors

Jonathan Walker (jwalker@kirksville.k12.mo.us) is a Lecturer in the Business and Administration Department at Culver-Stockton College.

Charlene Atkins (catkins@ucmo.edu) is an Associate Professor, Mathematics Education, at the University of Central Missouri.

Abstract

Investigating Career and Technical Education's (CTE) signature pedagogies provides an analysis of the most commonly used classroom instructional strategies. One hundred thirty-three CTE teachers representing area career centers, comprehensive high schools, two-year community colleges, and four-year universities participated in this ex post facto study. Data suggest that CTE teachers use questioning, demonstrations, lab activities, interactive lecture, and project-based learning strategies most often. Additionally, data show there are significant differences in classroom instructional strategies used by teachers of different subject areas and by teachers of different demographic backgrounds.

Keywords: pedagogy, instructional strategies, CTE, career education, technical education

Career and Technical Education (CTE) programs have rigorous curricula that provide students with a well-rounded education while also providing skills and training in line with industry needs (Dougherty, 2016). Studies of CTE achievement rates (Blowe & Price, 2012; Dougherty, 2016) have shown that concentrators—students who earn three or more credits in a single CTE program of study—are more likely to graduate, enroll in college, be employed, and earn higher wages than similar students who did not concentrate in CTE. In fact, Strengthening Career and Technical Education for the 21st Century Act of 2018 (Perkins V) stated that graduation rates for CTE students are 10 percent higher than the graduation rate for all students (Congress.gov, 2018). CTE is a vital part of the educational system, with the U.S. Bureau of Labor and Statistics (2021) projecting that by 2022 there will be over 50 million job openings for CTE graduates.

In Missouri, CTE education is delivered at the secondary, postsecondary, and adult levels through comprehensive high schools, area career and technical centers, and colleges and universities. In the 2015-16 school year, Missouri enrolled 133,520 high school students in CTE classes (DESE, 2018) that were part of programs leading to further education or employment in high-skill, high-wage, and high-demand occupations or professions. In the 2016-17 school year, 248,596 students participated in CTE classes through public high schools, area career centers, community colleges, and four-year colleges and universities (DESE, n.d.). Industry-recognized certificates and credentials were earned by 9,055 Missouri high school students in the 2018-19 school year (DESE, 2020). Students who participated in postsecondary CTE coursework, even without earning credentials, earned a higher yearly salary than high school graduates who did not take postsecondary CTE courses (Silverberg et al., 2004).

To date, little research has been conducted regarding specific pedagogies used in particular CTE disciplines to make content comprehensible to students. Teaching style impacts students' academic achievement (Conti, 1985); however, few researchers have investigated factors that contribute to CTE teachers' choice of particular pedagogies. As teacher educators understand

more about the learning process, their choice in instructional strategies becomes more efficient and effective for teacher candidates (Hergenhahn & Olson, 2005). Therefore, this research sought to identify signature pedagogies used in CTE classrooms and to determine whether any significant differences in pedagogical practices exist between demographic groups in order to inform educator preparation practices.

Purpose of the Study and Research Questions

The purpose of this study was to investigate the signature pedagogies currently being used by Missouri CTE educators and to determine whether there are any significant differences related to s pecific teacher demographics, such as years of experience, subject taught, region employed, or pathway to teacher certification. This study was driven by two research questions:

What are the signature pedagogies used by Missouri CTE educators?

Are there significant differences in pedagogical practices among Missouri CTE educators?

Review of the Literature

Conceptual Framework

Educational philosophies reflect teachers' beliefs on the purpose of education and how students learn. Teacher candidates are often asked to develop their educational philosophy statements during their preparation program and prior to the student teaching experience. Candidates must then base their philosophies on learning theories and historical influences rather than on extensive pedagogical content knowledge and teaching experience. Over time, philosophies can evolve as classroom teachers spend countless hours developing lessons, examining assessments, attending professional development events, communicating with students, and reflecting on practice. As philosophies evolve, educators become subject matter experts and continue to refine their techniques for determining and implementing effective instructional strategies. Just as one educator's philosophy can differ from another's, pedagogical practices can differ from one discipline to another.

Signature Pedagogies

Siraj-Blatchford et al. (2002) defined pedagogies as the instructional techniques and strategies which allow learning to take place. Signature pedagogies, those common to specific disciplines, are based on the educational practices and assumptions about the learning process in the discipline. Signature pedagogies were initially presented as a concept for professional education, but the term is now used to apply to all disciplines. By studying signature pedagogies, researchers can identify instructional strategies to be included in CTE teacher preparation programs in order to shrink the gap between academic success in CTE classes and professional preparation for the workplace (Chick, Haynie & Gurung, 2012). Fletcher and Djajalaksana (2014a) researched teacher demographics and CTE pedagogies in the United States and have provided a foundation for this current research.

Shulman (2005) suggested that signature pedagogies are easily identifiable for some professional education content areas. For example, law school requires memorization of numerous details and uses question-and-answer techniques to ensure students' understanding and ability to analyze and apply the information, while training for nurses and physicians includes extensive clinical experiences to ensure students' ability to apply their knowledge to real-life situations. These examples demonstrated that the pedagogies educators select as appropriate for a specific career field are based on the knowledge students are required to possess in that field in order to be successful. While there have been numerous studies on signature pedagogies in traditional academic disciplines, a gap exists in the literature regarding whether a signature pedagogy exists for CTE specifically.

In addition, little is understood about the factors that contribute to the teacher's selection of particular instructional approaches (Fletcher & Djajalaksan, 2014b). Shulman suggested that once a signature pedagogy has been identified for CTE, more research should be conducted, so that we can learn how to "improve teaching and learning in professions in which they are not now signatures" (Shulman, 2005, p. 56). Aldfeld (2016) supported the notion that policymakers and practitioners need more research concerning CTE pedagogies in order to make better decisions.

Fletcher, Djajalaksana, and Eison (2012) conducted research targeting 1,518 CTE higher education faculty members. With 387 participants responding to their online survey, findings revealed that the three most frequently used CTE classroom instructional strategies were questioning, whole-group discussion, and guided practice. The three least frequently used instructional strategies were question and answer, synchronous online lecture, and video creation. In a

subsequent study, Fletcher and Djajalaksana (2014a) investigated the potential signature pedagogies of P-12 educators. Researchers found that lab activities, project-based learning, and guided practices were the most frequently used instructional strategies. Least frequently used strategies included synchronous online lecturing, asynchronous online lecturing, and reflective blogs. These least frequently used strategies may be representative of strategies used in distance learning environments which may not have been the typical classroom environment in the year 2014.

A comprehensive literature review for this research found few studies on identifying the signature pedagogies currently being used in CTE classrooms or on investigating how CTE teacher demographics impact the classroom instructional strategies implemented. Therefore, a void in the literature exists regarding whether there is a signature pedagogy for CTE. Results of this study will help fill this gap.

Research Design and Methodology

This descriptive research study used quantitative research methods to answer the research questions. In the state of Missouri, CTE programs offered in shared-time career and technical education centers and comprehensive high schools include agriculture education, business education, health sciences education, family and consumer sciences and human services education, marketing education, skilled technical sciences, and technology and engineering education (DESE, n.d.). In terms of faculty at career and technology shared-time centers and comprehensive high schools, in the 2018-19 academic year, there were 486 full-time and seven part-time agriculture education teachers, 1,007 full-time and 54 part-time business education teachers, 320 full-time and five part-time health sciences education teachers, 677 full-time and 29 part-time family and consumer science and human services education teachers, 214 full-time and five part-time marketing education teachers, 445 full-time and 25 part-time skilled technical science teachers, and 328 full-time and five part-time technology and engineering education teachers (DESE, n.d.). Based on these data, it was determined that 3,477 full-time CTE teachers were employed in Missouri at the time of this study.

Data Collection Instrument

Fletcher, Djajlaksana, and Eison (2012) developed a survey tool to determine signature pedagogies in a higher education setting. Their survey consisted of a list of 14 demographic and 107 instructional strategy questions. With approval of Fletcher et al. (2012), this study used a modified, web-based version of their instrument. The modified survey, shown in Table 7, collected data through demographic categories and Likert type scale questions on instruc tional strategies used by participants. A list of instructional strategies was provided in this survey; however, the list did not include a definition or description of the instructional strategies.

To address the second research question, the modified survey instrument included additional questions in the demographic section to determine whether any significant differences existed between groups based on: the pathway to CTE certification, the region in which participants taught, or years of teaching experience. Content validity of this modified instrument was measured by a panel of six expert CTE evaluators, representing faculty in agricultural education, family consumer science and human services education, and business and marketing education. This study received Institutional Review Board (IRB) Exempt level approval, granted by the university ethics committee, and assigned protocol number 1443.

Participants

With assistance from the Missouri Council of Career and Technical Administrators (MCCTA), the data collection tool was shared electronically with CTE teachers throughout the state of Missouri. Responses were received from 139 participants, however only 138 consented to completing the survey. Of these 138 participants, five did not answer any questions and therefore did not contribute data to the research. Not all of the 133 total participants answered every survey question. Ten of the participants indicated they were not a CTE teacher, however their data were unidentifiable and therefore included in the demographic report below.

Data Analysis

Data collected from the teacher-completed survey were exported into the SPSS software for sorting, analyzing, and interpreting. Following the initial non-statistical data analyses, data were analyzed using descriptive and inferential statistics with an a priori level of $\propto = 0.05$. The data from questions 2 through 9 were analyzed by the following demographic categories: the region of Missouri where the teacher worked, geographic setting of the teacher's school, type of school in which the teacher worked, subject area taught, certification method, and years of experience.

Data from survey questions 10 through 16 indicated how often teachers reported using specific strategies. In order to conduct quantitative analyses, a value of

six points was assigned to Always, five points to Almost Always, four points to Frequently, three points to Occasionally, two points to Rarely, and one point to Never. Based on reported frequency of use, the top three classroom instructional strategies were determined by analyzing the means of each frequency.

Data from survey question 17 identified pedagogies reported by respondents. The three most-used classroom instructional strategies were determined by teachers self-reporting the three most-used strategies from a pool of identified strategies. Strategies receiving the three highest rankings were determined to be the signature strategies of Missouri CTE teachers participating in this study.

Finally, nominal, and ordinal level data were analyzed using Kruskal-Wallis H tests with post hoc tests to determine whether any significant differences existed between demographic groups. The Kruskal-Wallis test is a nonparametric test used to identify any significant differences in ordinal data by ranking the data and comparing "the median ranks for all groups with the individual group medians" (Aldrich, 2019, p. 189). When the Kruskal-Wallis test identifies an overall significance between groups, a pairwise comparison post hoc test is used to determine which two groups are significantly different.

Results and Discussion

Results

The following sections will provide the reader with a descriptive summary of participant demographics, results of survey questions 10 thru 17, and statistically significant findings. Statistically significant findings were determined using a non-parametric test as data collected were nominal and ordinal in nature. Groups were independent and determined by demographic information collected through survey questions.

Teaching region. Participants were asked to select the region of the state in which their school was located (see Table 1). Of the 133 participants, two did not answer this question. The region most represented by the 131 respondents was the central region (n = 42, 32.06%) while the region least represented was the southwest region (n = 11, 8.40%).

Geographical setting. All 133 participants answered the question regarding geographical setting. Participants selected either urban, suburban, or rural. The geographical setting most represented was rural (n = 70, 52.63%) while the setting least represented was urban (n = 15, 11.28%). The suburban population was represented by 48 participants (36.09%).

Type of school. Of the 133 total participants, all indicated the type of school in which they teach (see Table 2). The school type most represented was area career centers (n = 100, 75.19%). The type least represented was four-year universities (n = 1, 0.75%). One participant indicated the type of school in which they taught was unknown (n = 1, 0.75%).

Subject area taught. Nine participants did not answer the survey question regarding subject area taught (see Table 3). Of the 124 who did respond, the subject area most represented was health sciences (n = 20, 24.19%). The subject area least represented was agriculture education (n = 6, 4.84%).

Certification method. Of the 133 total participants, 19 did not answer the survey question regarding certification method (see Table 4). Of the 113 who did respond, the certification method most represented was four-year university with student teacher (n =41, 36.28%). The certification method least represented was alternative/innovative certification method (n = 16, 14.16%).

Years of experience. Of the 133 total participants, 20 did not respond to the survey question regarding years of teaching experience (see Table 5). Of the 113 respondents, the range most represented was 0 to 3 years (n = 21, 19%). The ranges least represented were 20 to 23 years (n = 11, 10%) and more than 23 years (n = 11, 10%).

Research Question Analysis

The first research question asked was 'What are the signature pedagogies used by Missouri CTE teachers?' In order to answer this question, the researchers determined the three most frequently used classroom instructional strategies based on participant responses to survey questions 10 through 16. The mean response and standard deviation were calculated for each strategy. Data showed that the three most frequently used classroom instructional strategies, those with the greatest mean, were questioning ($\bar{x}$ = 4.82, SD = .96), demonstrations ($\bar{x}$ = 4.59, SD = 1.17), and lab activities ($\bar{x}$ = 4.59, SD = 1.36).

Survey question 17 also provided data addressing the first research question. For this question, participants selected the three classroom instructional strategies they prefer to use, from a list of strategies that Fletcher developed (Fletcher, Djajalaksana & Eison, 2012). The three instructional strategies most preferred were interactive lecture (n = 38, 35.19%), project-based learning (n = 29, 26.85%), and lab activities (n = 28, 25.93%).

For further examination, data were also sorted to determine the three most-used strategies based on subject area taught. The mean and standard deviation were found for each strategy within each subject area. Questioning was found to be the only strategy in the top-three identified by all subject areas. A summary of the top three strategies by subject area is reported in Table 6.

Question Two Analysis

Research question two asked 'Are there significant differences in pedagogical practices among CTE educators?' The null hypothesis states that there is no significant difference in pedagogical practices among Missouri CTE teacher demographic groups. Comparing mean ranked scores using the Kruskal-Wallis H test, followed by a pairwise comparison post hoc test, did identify statistically significant differences in frequency of classroom instructional strategies used. Based on the following data and analyses, the null hypothesis was rejected for some demographics groups. The following sections will present statistically significant differences, identified by the Kruskal-Wallis test, based on demographic groups.

Teacher certification method. Four different CTE teacher certification methods were compared: Four-year university with student teaching, Career education certification method, SREB-based career education method (CTTE cohort courses), and Alternative/innovative certification method. A statistically significant difference in classroom instructional strategies used by respondents who had pursued different teacher certification pathways was found. Teachers who pursued the career education certification pathway (mean rank = 68.88) used on-the-job training pedagogies more than any other teachers participating in this research, and significantly more than teachers who pursued the four-year university with student teaching pathway (mean rank = 46.33) and respondents who pursued an alternative/certification pathway (mean rank = 37.66); ($x^2(3) = 15.49$, $p = 0.001$, $\eta^2 = .145$).

A pairwise comparison post hoc test also found that those who followed a SREB-based career education pathway (mean rank = 68.75) used the self-assessment instructional strategy more than any other teachers participating in this research, and significantly more than respondents who followed an alternative/innovative certification pathway (mean rank = 36.03); ($x^2(3) = 44.49$, $p = 0.009$, $\eta^2 = .107$). Data also identified a significant difference in the use of the literature review strategy by respondents who pursued different certification methods. Respondents who followed a SREB-based career education pathway used the literature review strategy (mean rank = 64.13) more than any other respondents, and significantly more than respondents who were certified through a traditional four-year university with student teaching (mean rank = 44.32); ($x^2(3) = 10.06$, $p = 0.030$, $\eta^2 = .094$).

Years of teaching experience. Data suggested a significant difference in classroom instructional strategies based on years of teaching experience. Teachers with 20 to 23 years of experience (mean rank = 72.20) used reflective blogs significantly more than teachers with only 16 to 19 years of experience (mean rank = 38.07); ($x^2(6) = 13.02$, $p = 0.043$, $\eta^2 = .122$).

CTE content area. The data analysis found significant differences in the use of the on-the-job training by CTE content area. Health science teachers (mean rank = 80.77) used on-the-job training more than any other teachers participating in this research, and significantly more than the business, marketing, and information technology teachers (mean rank = 34.45), engineering and technology education teachers (mean rank = 41.77), and skilled technical science teachers (mean rank = 48.37); ($x^2(5) = 34.97$, $p = 0.000$, $\eta^2 = .327$).

Health science teachers (mean rank = 70.57) also used interactive lecture more than any other teachers participating in this research, and significantly more than engineering and technology education teachers (mean rank = 43.41); ($x^2(5) = 11.63$, $p = 0.040$, $\eta^2 = .109$). Health science teachers (mean rank = 70.24) also used whole group discussion more than any other teachers participating in this research, and significantly more than business, marketing, and information technology teachers (mean rank = 41.71); ($x^2(5) = 16.52$, $p = 0.006$, $\eta^2 = .154$). Additionally, health science teachers (mean rank = 76.76) used quizzes more than any other teachers participating in this research, and significantly more than business, marketing, and information technology teachers (mean rank = 43.41); ($x^2(5) = 24.47$, $p = 0.000$, $\eta^2 = .229$).

Health science teachers (mean rank = 68.11) used case studies more than any other teachers participating in this research, and significantly more than engineering and technology education teachers (mean rank = 38.91); ($x^2(5) = 0.04$, $p = 0.036$, $\eta^2 = .112$). Finally, health science teachers (mean rank = 60.40) used lectures more than any other teachers participating in this research, and significantly more than engineering and technology education teachers (mean rank = 33.56); ($x^2(5) = 18.16$, $p = 0.003$, $\eta^2 = .170$).

Family and consumer science and human services teachers (mean rank = 79.71) used personal reflection more than any other teachers participating in this research, and significantly more than business, marketing, and information technology teachers (mean rank = 45.33); ($x^2(5) = 15.70$, $p = 0.008$, $\eta^2 = .147$). Family and consumer science and human services teachers (mean rank = 80.21) also used reflective blogs more than any other teachers participating in this research, and significantly more than skilled technical sciences teachers (mean rank = 41.58) and health science teachers (mean rank = 52.06); ($x^2(5) = 18.09$, $p = 0.003$, $\eta^2 = .169$).

Agriculture teachers (mean rank = 89.0) and health science (mean rank = 65.80) teachers used work-based strategies more than any other teachers participating in this research, and significantly more than business, marketing, and information technology teachers (mean rank = of 37.65); ($x^2(5) = 17.34$, $p = 0.004$, $\eta^2 = .162$).

Type of school. Teachers in area career centers (mean rank = 60.6) use on-the-job training more than any other teachers participating in this research, and significantly more than teachers in comprehensive high schools (mean rank = 29.05); ($x^2(3) = 20.90$, $p = 0.000$, $\eta^2 = .195$). Teachers in area career centers (mean rank = 60.1) also use cooperative learning more than any other teachers participating in this research, and significantly more than teachers in comprehensive high schools (mean rank = 35.52); ($x^2(3) = 14.34$, $p = 0.002$, $\eta^2 = .134$). Teachers in community colleges (mean rank = 91.20) use the student attitude survey more than any other teachers participating in this research, and significantly more than teachers in comprehensive high schools (mean rank = 41.52); ($x^2(3) = 13.20$, $p = 0.004$, $\eta^2 = .123$).

Discussion

Based on all participant responses, the three most frequently used CTE classroom instructional strategies, those with the greatest mean use, are questioning, demonstrations, and lab activities. Based on all participant responses, the three most preferred strategies are interactive lecture, project-based learning, and lab activities. The results of this study indicate that questioning, demonstrations, lab activities, interactive lecture, and project-based learning pedagogies could be considered signature pedagogies of Missouri CTE educators. Of these five signature pedagogies, lab activities were identified as both a frequently used strategy and as a preferred strategy by all CTE instructors. When examined by content area taught, data show that the questioning strategy appears to be one of the top three strategies used by all content area instructors.

Results of this study also indicate that significant differences in frequency of pedagogical practice exist between demographic groups. For example, business teachers were found to use quizzes significantly less than health science teachers. In addition, teachers with 20-23 years of teaching experience used reflective blogs significantly more frequently than teachers with 16-19 years of experience. These differences may be the result of teaching confidence established over years of implementation or it may indicate trends in pedagogical practices emphasized in teacher preparation programs over the years. Another example can be found with agriculture and health science teachers who may use work-based learning more than other subject areas. This could be due to the fact that a majority of participants were from a rural area and may have access to subject specific work-based learning opportunities. Teachers earning their teaching certificate through the career education certification pathway reported using on-the-job training strategies significantly more than teachers earning their teaching certificate through a traditional four-year university with student teaching or through alternative certification pathways. Statistically significant differences, in frequency of pedagogical practice, between teachers of various certification pathways may indicate that there are great differences in teacher preparation programs offering these various pathways.

As a result of this study, we now have more data and information leading to the identification of signature pedagogies used by CTE educators. Knowing that CTE educators use lab activities, questioning, demonstrations, project-based learning, and interactive lectures most often, we now need to ask why. Are these choices influenced by instructional environments or available tools? Knowing that there are significant differences in frequency of pedagogical practices among CTE teachers of various certification pathways, content areas, years of experience, and type of school we now need to ask why these differences exist. Are these practices influenced by teacher preparation programs? Are pedagogical practices influenced by school community or local need?

Limitations and Recommendations for Future Research

Limitations

This study was dependent upon a convenience sample, of only one state. In addition, participants in this

study represent less than 10 percent of the Missouri CTE teacher population. Per Patten (2009), these data may not statistically represent CTE teachers in Missouri as a representative sample of the population, but these data still present valuable findings.

Once the data collection period started, it was apparent the timing of this research could hinder response rates as educators may have been busy administering state assessments, developing, and administering final exams, or preparing for summer session at this time of year. Although the data remained anonymous, many CTE teachers elected not to participate in the survey resulting in a disproportional sample in regard to region and subject area taught. This may have impacted the statistical findings when sorting by demographics. In addition, researchers were unable to identify and eliminate specific demographic responses from the 10 respondents who reported not teaching in a CTE classroom. This may have impacted only demographic results as participants who were not CTE teachers did not complete the survey beyond demographic information. Therefore, this did not impact the statistical analyses or interpretation of findings.

This survey provided a long but limited list of pedagogies for participants to choose from. It is possible that participants use pedagogies not included on the survey list. Though the survey did allow for participants to identify "other" practices, participants may have found it convenient to select from the list rather than provided additional information. The possibility exists that, without included definitions or descriptions, some participants interpreted pedagogical terms differently and which could have caused responses to vary from actual practice.

This study sought to identify signature pedagogies of CTE teachers and to determine any significant differences in pedagogical practices based on demographic factors. According to Shulman (2005), signature pedagogies have three fundamental dimensions: think, perform, and act with integrity. Shulman also explains that these three dimensions "do not receive equal attention across professions" (p. 52). This study focused primarily on the surface structure described by Shulman (2005) as "concrete operational acts of teaching and learning" (p. 52). Researchers determined that signature pedagogies identified by frequency of use include questioning, demonstrations, and lab activities. In addition, signature pedagogies identified by instructor preference include interactive lecture, project-based learning, and lab activities. When looking at the most used pedagogy by subject area, questioning appeared in the top-three strategies for all subject areas. These findings are consistent with that of Fletcher and Djajalaksana (2014), as they also found interactive lecture, project-based learning, and lab activities to be the most frequently used strategies among the 362 study participants.

Recommendations for Future Research

Based on the research design, data collection, and data analyses, the researchers offer the following conclusions and recommendations. First, teacher preparation programs should examine current pedagogical practices to determine whether these practices align with CTE instructional needs. Second, researchers should consider expanding the study to a larger population of nationwide CTE teachers, as this would address concerns of external validity and generalization of the sample to the population. A larger population of respondents with a proportionate representation of each demographic would allow researchers to further investigate the impact of demographic factors. For example, researchers could determine if health science instructors in rural areas have the same signature pedagogies as health science instructors in urban districts. Instructors and students in urban districts may possibly have greater access to high-speed internet and therefore can use online strategies more frequently than those in rural districts with lower quality internet service.

The reasons why specific pedagogy is used more by teachers of one subject area than those in other subject areas is unknown. For example, instructors of agriculture education implement work-based learning strategies more often than business, marketing, and information technology teachers. Agriculture instructors possibly have access to authentic work-based tasks while business, marketing and information technology instructors do not. Another possibility is that participants of this study had differing interpretations of work-based learning which influenced their survey responses.

Though this particular study was limited to a convenience sample from one state, the results do contribute to the greater conversation and huge task of identifying signature pedagogies of Career and Technical Education. Identifying the signature pedagogies will contribute to the improvement of teacher preparation programs. This will, in turn, help the greater education community by growing a proven successful CTE program and better preparing both CTE teacher candidates and incoming students for academic success.

References

Aldfeld, C. (2016, Feb. 3). Career technical education is growing; Research must follow (Blog post, Institute of Education Resources website). https://ies.ed.gov/blogs/research/post/career-technical-education-is-growing-research-must-follow

Aldrich, J. O. (2019). *Using IBM SPSS statistics: An interactive hands-on approach.* (3rd ed.). SAGE Publications, Inc.

Blowe, E. H., & Price, T. (2012, August 23). Career and technical education: Academic achievement and graduation rates of students in the Commonwealth of Virginia. *SAGE Open.* doi:10.1177/2158244012455437

Chick, N. L., Haynie, A. & Gurung, R. A. (Eds.). (2012). *Exploring signature pedagogies: Approaches to teaching disciplinary habits of mind.* Stylus Publishing.

Congress.gov. (2018). H.R.2353 - *Strengthening career and technical education for the 21st century act.* https://www.congress.gov/bill/115th-congress/house-bill/2353/text

Conti, G. (1985). Assessing teaching style in adult education: How and why. *Lifelong Learning, 8*(8), 7–11.

Dougherty, S. (2016, April 7). *Career and technical education in high school: Does it improve student outcomes?* Thomas B. Fordham Institute. https://fordhaminstitute.org/national/research/career-and-technical-education-high-school-does-it-improve-student-outcomes

Fletcher, E. C., Jr., Djajalaksana, Y., & Eison, J. (2012). Instructional strategy use of faculty in career and technical education. *Journal of Career and Technical Education*, 27(2),1533–1830.

Fletcher, E. C., Jr., & Djajalaksana, Y. M. (2014a). Career and technical education teachers' use of instructional strategies in the P-12 classroom. *Workforce Education Forum*, 37(1), 1-22.

Fletcher E. C., Jr., & Djajalaksana, Y. M. (2014b). Predictors of instructional strategy use of faculty in career and technical education programs: Signature pedagogies of the field. *International Journal of Adult Vocational Education and Technology (IJAVET)*, 5(3), 45–65. https://ideas.repec.org/a/igg/javet0/v5y2014i3p45-65.html

Hergenhahn, B. R., & Olson, M. H. (2005). *An introduction to theories of learning* (5th ed.). Prentice Hall.

Missouri Department of Elementary and Secondary Education (DESE). (n.d.). *Career education.* https://dese.mo.gov/college-career-readiness/career-education

Missouri Department of Elementary and Secondary Education (DESE). (2020). *Career education in Missouri: Show me learning that works.* https://dese.mo.gov/college-career-readiness/career-education

Patten, M. (2009). *Understanding research methods: An overview of the essentials.* Pyrczak Publishing.

Shulman L. (2005, February, 6). *The signature pedagogies of the professions of law, medicine, engineering, and the clergy: Potential lessons for the education of teachers* [Lecture]. Teacher Education for Effective Teaching and Learning, Irvine, CA. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwiYjYPugsDxAhXMmmoFHRVWBtgQFjAAegQIBRAD&url=https%3A%2F%2Ftaylorprograms.com%2Fwp-content%2Fuploads%2F2018%2F11%2FShulman_Signature_Pedagogies.pdf&usg=AOvVaw11T6VWbFybRYdlQjShyxwx

Siraj-Blatchford, I., Sylva, K., Muttock, S., Gilden, R., & Bell, D. (2002). *Researching effective pedagogy in the early years*. https://dera.ioe.ac.uk/4650/1/RR356.pdf

Silverberg, M., Warner, E., Fong, M., & Goodwin, D. (2004). *National assessment of vocational education: Final report to Congress.* U.S. Department of Education.

U.S. Bureau of Labor Statistics. (2021). *Career and technical education teachers.* https://www.bls.gov/ooh/education-training-and-library/career-and-technical-education-teachers.htm

Appendix

Table 1

Participant Demographics by Regions in Missouri

Region of Missouri	# of Participants	% of Participants
Central	42	32.06
Northeast	28	21.37
Northwest	24	18.32
Southeast	17	12.98
Southwest	11	8.40
Not Sure	7	5.34
Prefer not to answer	2	1.53

Table 2

Participant Demographics by Type of School

Type of School	# of Participants	% of Participants
Area career center	100	75.19
Comprehensive high school	24	18.05
Community college	7	5.26
Four-year university	1	0.75
Not sure	1	0.75

Table 3

Participant Demographics by Subject Area Taught

Subject Area	# of Participants	% of Participants
Health sciences	30	24.19
Engineering and technology education	24	19.35
Business, marketing, and information technology	21	16.94
Skilled technical sciences	19	15.32
Family consumer sciences & human services	14	11.29
Agriculture education	6	4.84
Not a CTE teacher	10	8.06

Table 4

Participant Demographics by Teacher Certification Method

Certification Method	# of Participants	% of Participants
Four-year university with student teaching	41	36.28
Career education certification method	34	30.09
SREB-based career education method (CTTE cohort courses)	14	11.29
Alternative/innovative certification method	6	4.84

Table 5

Participant Demographics by Number of Years of Teaching Experience

Years of Teaching Experience	# of Participants	% of Participants
0 to 3 years	21	19
4 to 5 years	20	18
8 to 11 years	22	19
12 to 15 years	13	11
16 to 19 years	15	13
20 to 23 years	11	10
more than 23 years	11	10

Table 6

Three Most-Used Classroom Instructional Strategies for Each Subject Area

CTE Subject Area	Strategy	Mean	Std. Deviation
Agriculture Education	Work-Based Learning (SAE or SBE) Demonstrations Questioning	5.4 5.0 5.0	0.89 0.00 1.00
Business, Marketing & Information Technology	Questioning Problem-Based Learning Guided Practice	4.76 4.48 4.48	0.89 0.99 1.21
Family Consumer Sciences & Human Services	Questioning Lab Activities Whole Group Discussion	5.21 5.00 4.78	1.05 0.96 0.97
Skilled Technical Sciences	Questioning Whole Group Discussion Guided Practice	4.74 4.63 4.63	0.87 0.96 0.96
Health Sciences	On-the-job training Questioning Lab Activities Whole Group Discussion	5.21 5.19 4.83 4.83	1.52 1.00 1.26 1.07
Engineering and Technology Education (Industrial Technology, Technology Education, PTLW©, Industrial Arts, Understanding by Design)	Questioning Whole Group Discussion Guided Practice	4.96 4.95 4.73	.83 .071 1.03

Table 7

Survey Instrument

Question 1: In which region of Missouri is your school located?

Question 2: Which of the following geographical settings would you consider your school?

Question 3: In what type of school is your primary location of teacher?

Question 4: Select one of the following areas which you consider your primary CTE subject area

Question 5: Please identify one specific course that you teach regularly and type the course name in the space provided. Use this course as you reference point when completing the survey

Question 6: How did you earn your Missouri teaching certificate?

Question 7: How many years have you been teaching?

Question 8: Did you have a person of significance in your lie who was a teacher before you became certified to teach (e.g., a parent/guardian, grandparent, aunt uncle, sibling, another teacher etc.)?

Question 9: This section consists of a list of classroom strategies. Mark whether you Never, Rarely, Occasionally, Frequently, Almost Always, or Always use the strategy in your classroom. Instructional Strategy Usage in the Classroom. *** See below for a complete list of strategies to choose from for questions 9-16.

Question 10: Instructional Strategy Usage in the Classroom (continued)

Question 11: Instructional Strategy Usage in the Classroom (continued)

Question 12: Instructional Strategy Usage in the Classroom (continued)

Question 13: Instructional Strategy Usage in the Classroom (continued)

Question 14: Instructional Strategy Usage in the Classroom (continued)

Question 15: Instructional Strategy Usage in the Classroom (continued)

Question 16: In the teaching of the course, you selected in Question 5, what are the THREE (3) instructional strategies you use the most? Please check only three (3) instructional strategies from the list.

Question 17: If you cannot find the strategies you most frequently use above, please specify in the text boxes below.

Question 18: What other information would you like to provide regrading in the instructional strategies you use in your CTE courses.

***Questioning, Whole Group Discussion, Guided Practice, Interactive Lecture, Self-Directed Learning, Problem-Based Learning, Major Writing Project, Lab Activities, Demonstrations, Student Presentations, Short Paper, Student Peer Assessment, Small-Group Discussion, Online Discussions, Quizzes, Personal Reflection, Cooperative Learning, Learning Portfolio, Student Attitude Survey, Brainstorming, Asynchronous Online, Student Peer Teaching, Review Sessions, Literature Review, Online/E-Portfolio, Case Study, Lecture, Question & Answer using clickers/Personal Response Systems, Guest Lecture, Think/Pair/Share, Minute Papers/Sentence Summary, Role Play, Games, Computer Simulations, Debates, In-Class Informal Writing, Original Research, Student-Generated Quiz/Exams, Concept Maps/Mind Maps, Campus Events, Film/Video Critique, Annotated Bibliography/Webliography, Self-Assessment, Field Trips, Service Learning, Video Creation, Online Discussion, Reflective Blogs, Online Formative Quizzes, Online Collaborative Projects, Synchronous Online Lecture, Participating in Social Networking, Computer-Based Learning Exercises/Games Simulations, Project-based Learning, On-the job Training, Work-based Learning(SAE or SBE), Other*, *If other, please list